



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/661,048	09/13/2003	Qun Ying Lin	CS02-096	6738

7590

07/12/2005

William J Stoffel
Ste A- PMB 455
1735 Market St
Philadelphia, PA 19103

EXAMINER

ROSASCO, STEPHEN D

ART UNIT	PAPER NUMBER
----------	--------------

1756

DATE MAILED: 07/12/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/661,048

Applicant(s)

LIN ET AL.

Examiner

Stephen Rosasco

Art Unit

1756

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 June 2005.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-57 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-57 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 9/13/03.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

Detailed Action

In response to the traversal of the restriction requirement the examiner withdraws the requirement and will examine all of the claims.

The disclosure is objected to because of the following informalities: page 2, line 21, "for a" before "method" should be deleted.

Appropriate correction is required.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 2, 5, 8 and 13 are rejected under 35 U.S.C. 102(e) as being anticipated by Ishikawa (US 2004/0018436).

The claimed invention is directed to a phase shift mask for use with light at a wavelength comprising: a first phase shift section, a half tone section, and a second phase shift section; said first phase shift section adjacent to said half tone section; said half tone section adjacent to said second phase shift section; said first phase shift section and half tone section changing the phase of incident light by about 180 degrees with respect to said second phase shift section.

And which further includes said first phase shift section comprised of a first phase shift region of a mask substrate, a trench in said first phase shift region, and said half tone

section comprised of (i) a half tone region of said mask substrate and (ii) a half tone layer over said half tone region; said second phase shift section has about a 0 degree phase shift.

The claims also include methods for making the mask and the use of the mask to make devices.

Ishikawa teaches on page 3, in section [0038] that the light-blocking film 2 can be a semi-transparent film (half-tone type phase shift mask).

And in section [0040]. The mask of FIG. 2A is formed at light-passing regions 4a, 4b with trenches differing in depth. Due to this, light passing through the light-passing regions 4a and light passing through the light-passing regions 4b are inverted in phase. The masks of FIGS. 2B and 2C are formed at light-passing regions 4b with phase shifters 5 having predetermined refractive indexes and thicknesses. Due to this, light passing through the light-passing regions 4a and light passing through the light-passing regions 4b invert in phase. The phase shifter 5a may be formed either on the quartz substrate via the light-blocking film as shown in FIG. 2B or between the quartz substrate and light-blocking film as shown in FIG. 2C.

The claims recite that the phase shift is referenced with respect to the incident light, however, it is the relative phase shift that produces the destructive interference at the image level. Ishikawa teaches the relationship between a phase region, a halftone shifting region and a light transmissive region.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishikawa (US 2004/0018436).

The claimed invention is directed to a phase shift mask for use with light at a wavelength comprising: a first phase shift section, a half tone section, and a second phase shift section; said first phase shift section adjacent to said half tone section; said half tone section adjacent to said second phase shift section; said first phase shift section and half tone section changing the phase of incident light by about 180 degrees with respect to said second phase shift section.

And which further includes said first phase shift section comprised of a first phase shift region of a mask substrate, a trench in said first phase shift region, and said half tone section comprised of (i) a half tone region of said mask substrate and (ii) a half tone layer over said half tone region; said second phase shift section has about a 0 degree phase shift.

The claims also include methods for making the mask and the use of the mask to make devices.

Ishikawa teaches on page 3, in section [0038] that the light blocking film 2 can be a semi-transparent film (half-tone type phase shift mask).

And in section [0040] The mask of FIG. 2A is formed at light passing regions 4a, 4b with trenches differing in depth. Due to this, light passing through the light passing regions 4a and light passing through the light passing regions 4b are inverted in phase.

The masks of FIGS. 2B and 2C are formed at light-passing regions 4b with phase shifters 5 having predetermined refractive indexes and thicknesses. Due to this, light passing through the light-passing regions 4a and light passing through the light-passing regions 4b invert in phase. The phase shifter 5a may be formed either on the quartz substrate via the light-blocking film as shown in FIG. 2B or between the quartz substrate and light-blocking film as shown in FIG. 2C.

The teachings of Ishikawa et al. differ from those of the applicant in that the applicant teaches that the phase shift is referenced with respect to the incident light and specific amounts of light transmission through the mask regions are claimed.

However, it is the relative phase shift that produces the destructive interference at the image level and in addition the amount of light is always adjusted in a half-tone mask to meet the specific design requirements.

Ishikawa teaches the same spatial relationship between a phase shifting region, a half-tone shifting region and a second phase shifting region, and wherein the half-tone region is adjacent to a first phase shifting region and has the same phase of light transmission as this phase shifting region.

Therefore, it would have been obvious to one having ordinary skill in the art to take the teachings of Ishikawa and adjust the amount of light transmission and relative phase of the incident light in order to make the claimed invention because one in the art would know to adjust the relative phase of incident light and the amount of transmission to meet the specific design requirements.

Art Unit: 1756

Conclusion

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Stephen Rosasco whose telephone number is (571) 272-1389. The Examiner can normally be reached Monday-Friday, from 8:00 AM to 4:30 PM. The Examiner's supervisor, Mark Huff, can be reached on (571) 272-1385. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read 'S. Rosasco', with a stylized, elongated 'S' and a horizontal line extending from the end.

S. Rosasco
Primary Examiner
Art Unit 1756

S. Rosasco
07/05/05